

Claims

1. A water dispersible polyisocyanate composition bearing urea comprising
 - (a) an aliphatic polyisocyanate or a mixture of aliphatic polyisocyanates
5 or a mixture of aliphatic polyisocyanates with other polyisocyanates;
and
 - (b) a reaction product of component (a) with component (c) a polyether
amine or a mixture of a polyether amine and a polyether alcohol.
- 10 2. The water dispersible polyisocyanate composition bearing urea
according to Claim 1, wherein the aliphatic polyisocyanate is selected from
the group consisting of isocyanurate, biuret, uretdione, urethane,
allophanate, carbodiimide, oxadiazinetrione derivatives, and mixtures
thereof.
- 15 3. The water dispersible polyisocyanate composition bearing urea
according to Claim 2, wherein the aliphatic polyisocyanate is a cyclic
polyisocyanate selected from the group consisting of isocyanurate
derivative, biuret derivative, and a mixture thereof.
- 20 4. The water dispersible polyisocyanate composition bearing urea
according to Claim 3, wherein the aliphatic polyisocyanate is selected from
the group consisting of 1,6-hexamethylene diisocyanate (HDI) trimer,
isophorone diisocyanate (IPDI) trimer, HDI/IPDI trimer, and a mixture
thereof.
5. The water dispersible polyisocyanate composition bearing urea
according to Claim 4, wherein the aliphatic polyisocyanate is HDI trimer.
- 25 6. The water dispersible polyisocyanate composition bearing urea
according to Claim 1, wherein the other polyisocyanate is an aromatic
polyisocyanate selected from the group consisting of 4,4-diphenylmethane

diisocyanate (MDI), polymeric MDI, toluene diisocyanate, xylene diisocyanate, and a mixture thereof.

7. The water dispersible polyisocyanate composition bearing urea according to Claim 1, wherein the polyether amine is selected from the group consisting of a polyether monoamine, polyether diamine, polyether triamine, and a mixture thereof, and the polyether alcohol is selected from the group consisting of a polyether monol, polyether diol, polyether triol, and a mixture thereof.

8. The water dispersible polyisocyanate composition bearing urea according to Claim 1, wherein the polyether amine is selected from the group consisting of a polyether monoamine and a polyether diamine, and the polyether alcohol is a polyether diol.

9. The water dispersible polyisocyanate composition bearing urea according to Claim 7, wherein the polyether monoamine and polyether diamine have a molecular weight of about 500 to about 3000 g/mole, and the polyether diol has a molecular weight of about 300 to about 1600 g/mole.

10. The water dispersible polyisocyanate composition bearing urea according to Claim 9, wherein the polyether monoamine and polyether diamine have a molecular weight of about 600 to about 2500 g/mole, and the polyether diol has a molecular weight of about 500 to about 1000 g/mole.

11. The water dispersible polyisocyanate composition bearing urea according to Claim 10, wherein the polyether monoamine and polyether diamine have a molecular weight of about 800 to about 1200 g/mole, and the polyether diol has a molecular weight of about 600 to about 800 g/mole.

12. The water dispersible polyisocyanate composition bearing urea according to Claim 1, wherein the weight ratio of ethylene oxide (EO) to

propylene oxidized (PO) of the polyether amine and polyether alcohol is greater than about 50:50.

13. The water dispersible polyisocyanate composition bearing urea according to Claim 12, wherein the weight ratio of ethylene oxide (EO) to propylene oxidized (PO) of the polyether amine and polyether alcohol is between about 60:40 and about 95:5.

14. The water dispersible polyisocyanate composition bearing urea according to Claim 13, wherein the weight ratio of ethylene oxide (EO) to propylene oxidized (PO) of the polyether amine and polyether alcohol is between about 70:30 and about 90:10.

15. The water dispersible polyisocyanate composition bearing urea according to Claim 7, wherein the polyether monoamine is selected from the group consisting of JEFFAMINE[®] M-1000 and JEFFAMINE[®] M-2070.

16. The water dispersible polyisocyanate composition bearing urea according to Claim 7, wherein the polyether diamine is selected from the group consisting of JEFFAMINE[®] ED-600, JEFFAMINE[®] ED-900, JEFFAMINE[®] ED-2001, and JEFFAMINE[®] ED-2003.

17. The water dispersible polyisocyanate composition bearing urea according to Claim 1, wherein the composition is prepared by reacting, based on the weight of the composition, about 99.5 % to about 92 % of component (a) with about 0.5 % to about 8 % of component (c).

18. The water dispersible polyisocyanate composition bearing urea according to Claim 1, wherein the composition is prepared by reacting, based on the weight of the composition, about 98 % to about 96 % of component (a) with about 2 % to about 4 % of component (c).

19. The water dispersible polyisocyanate composition bearing urea according to Claim 1, wherein the composition is prepared by reacting,

based on the weight of the composition, about 99 % to about 92 % of component (a) with about 0.5 % to about 4 % of polyether amines and about 0.5 % to about 4 % of polyether alcohols.

5 20. The water dispersible polyisocyanate composition bearing urea according to Claim 1, further comprising an inert organic solvent of low boiling point.

10 21. The water dispersible polyisocyanate composition bearing urea according to Claim 20, wherein the solvent is selected from the group consisting of ethyl acetate, acetone, dimethyl ethyleneglycol, methylethylketone and a mixture thereof.

22. The water dispersible polyisocyanate composition bearing urea according to Claim 1, wherein component (a) and component (c) are reacted at room temperature.

15 23. The water dispersible polyisocyanate composition bearing urea according to Claim 22, wherein the reaction is conducted in the absence of a catalyst.

24. A water dispersible polyisocyanate composition bearing urea and urea derivatives comprising

20 (a) an aliphatic polyisocyanate or a mixture of aliphatic polyisocyanates or a mixture of aliphatic polyisocyanates with other polyisocyanates; and

(b) a reaction product of component (a) with component (c) a polyether amine or a mixture of a polyether amine and a polyether alcohol;

25 wherein the composition is prepared by heating for conducting a subsequent reaction so as to increase the numbers of isocyanate functional groups contained in said composition.

25. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the aliphatic polyisocyanate is selected from the group consisting of isocyanurate, biuret, uretdione, urethane, allophanate, carbodiimide, oxadiazinetri-
5 derivatives, and mixtures thereof.

26. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 25, wherein the aliphatic polyisocyanate is a cyclic polyisocyanate selected from the group consisting of isocyanurate derivative, biuret derivative, and a mixture
10 thereof.

27. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 26, wherein the aliphatic polyisocyanate is selected from the group consisting of 1,6-hexamethylene diisocyanate (HDI) trimer, isophorone diisocyanate (IPDI) trimer,
15 HDI/IPDI trimer, and a mixture thereof.

28. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 27, wherein the aliphatic polyisocyanate is HDI trimer.

29. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 28, wherein the other polyisocyanate is an aromatic polyisocyanate selected from the group consisting of 4,4-diphenylmethane diisocyanate (MDI), polymeric MDI, toluene diisocyanate, xylene diisocyanate, and a mixture thereof.
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30. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the polyether amine is selected from the group consisting of a polyether monoamine, polyether diamine, polyether triamine, and a mixture thereof, and the polyether alcohol is selected from the group consisting of a polyether monol, polyether diol, polyether triol, and a mixture thereof.
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31. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the polyether amine is selected from the group consisting of a polyether monoamine and a polyether diamine, and the polyether alcohol is a polyether diol.
- 5 32. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 30, wherein the polyether monoamine and polyether diamine have a molecular weight of about 500 to about 3000 g/mole, and the polyether diol has a molecular weight of about 300 to about 1600 g/mole.
- 10 33. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 32, wherein the polyether monoamine and polyether diamine have a molecular weight of about 600 to about 2500 g/mole, and the polyether diol has a molecular weight of about 500 to about 1000 g/mole.
- 15 34. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 33, wherein the polyether monoamine and polyether diamine have a molecular weight of about 800 to about 1200 g/mole, and the polyether diol has a molecular weight of about 600 to about 800 g/mole.
- 20 35. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the weight ratio of ethylene oxide (EO) to propylene oxidized (PO) of the polyether amine and polyether alcohol is greater than about 50:50.
- 25 36. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 35, wherein the weight ratio of ethylene oxide (EO) to propylene oxidized (PO) of the polyether amine and polyether alcohol is between about 60:40 and about 95:5.
37. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 36, wherein the weight ratio of

ethylene oxide (EO) to propylene oxidized (PO) of the polyether amine and polyether alcohol is between about 70:30 and about 90:10.

38. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 30, wherein the polyether monoamine
5 is selected from the group consisting of JEFFAMINE[®] M-1000 and JEFFAMINE[®] M-2070.

39. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 30, wherein the polyether diamine is selected from the group consisting of JEFFAMINE[®] ED-600,
10 JEFFAMINE[®] ED-900, JEFFAMINE[®] ED-2001, and JEFFAMINE[®] ED-2003.

40. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the composition is prepared by reacting, based on the weight of the composition, about 99.5 %
15 to about 92 % of component (a) with about 0.5 % to about 8 % of component (c).

41. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the composition is prepared by reacting, based on the weight of the composition, about 98 %
20 to about 96 % of component (a) with about 2 % to about 4 % of component (c).

42. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the composition is prepared by reacting, based on the weight of the composition, about 99 %
25 to about 92 % of component (a) with about 0.5 % to about 4 % of polyether amines and about 0.5 % to about 4 % of polyether alcohols.

43. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, further comprising an inert organic solvent of low boiling point.

44. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 43, wherein the solvent is selected from the group consisting of ethyl acetate, acetone, dimethyl ethyleneglycol, methylethylketone, and a mixture thereof.
- 5 45. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein component (a) and component (c) are reacted at room temperature.
46. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 45, wherein the reaction is conducted
10 in the absence of a catalyst.
47. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the composition is heated to a temperature of about 100 to about 150 °C and reacted at the temperature for about 2 to about 8 hours.
- 15 48. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 47, wherein the composition is heated to a temperature of about 110 °C and reacted at the temperature for about 5 hours.
49. The water dispersible polyisocyanate composition bearing urea and
20 urea derivatives according to Claim 24, wherein the urea derivatives comprise biuret, triuret, and tetrauret.
50. The water dispersible polyisocyanate composition bearing urea and urea derivatives according to Claim 24, wherein the urea derivative are biuret.
- 25 51. A water dispersible polyisocyanate composition bearing biuret comprising
- (a) an aliphatic polyisocyanate or a mixture of aliphatic polyisocyanates or

a mixture of aliphatic polyisocyanates with other polyisocyanates; and

- (b) a reaction product of component (a) with component (c) a polyether amine or a mixture of a polyether amine and a polyether alcohol;

5 wherein the composition is prepared by heating for conducting a subsequent reaction so as to increase the numbers of isocyanate functional groups contained in said composition.

52. An aqueous resin adhesive comprising an aqueous resin and the water dispersible polyisocyanate composition according to Claim 1, 24 or 51.

10 53. The aqueous resin adhesive according to Claim 52, wherein the water dispersible polyisocyanate composition is in an amount of about 1 to about 5 %, based on the weight of the aqueous resin.

54. The aqueous resin adhesive according to Claim 53, wherein the water dispersible polyisocyanate composition is in an amount of about 2 to
15 about 4 %, based on the weight of the aqueous resin.

55. The aqueous resin adhesive according to Claim 52, wherein the aqueous resin is selected from the group consisting of polyurethane, polyvinyl acetate, polyvinyl alcohol, hydroxy polyacrylate and a mixture thereof.

20 56. The aqueous resin adhesive according to Claim 55, wherein the aqueous resin is aqueous polyurethane.